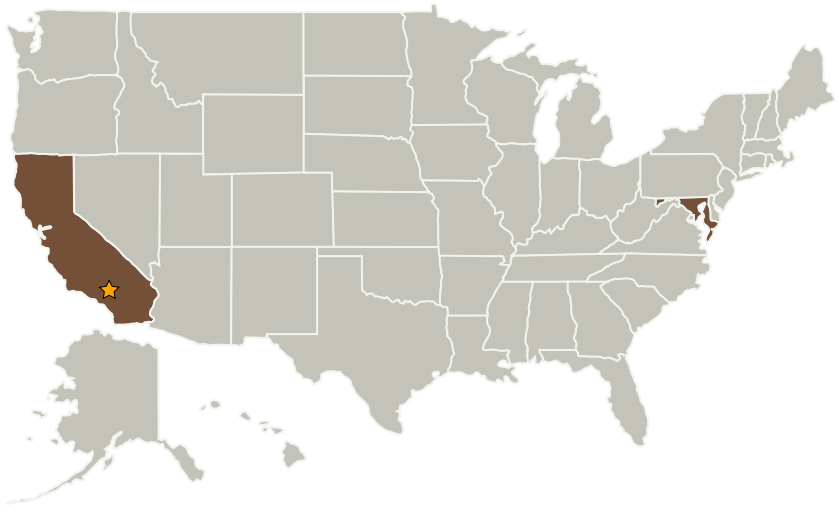
Smart Low-Cost Electronic Module for Simultaneous Sensor and Process Faults Moni, Phase I

Completed Technology Project (2003 - 2003)

Project Introduction

The detection and isolation of air vehicle process failures is difficult because air vehicle dynamics are nonlinear and the vehicle has many important and complicated sub-systems. The fault diagnosis performance is further complicated by the presence of sensor failures. In this proposal, Intelligent Automation, Incorporated (IAI) proposes a novel approach to perform simultaneous diagnosis of sensor and process faults for air vehicles. This algorithm can be embedded into low cost electronics. First, two independent residual vectors (RVs) for detection and isolation of the sensor and process faults are built. This is in sharp contrast to conventional methods, which can deal with either sensor failures or process failures but never both. Second, to isolate faults, the RV is transformed into a set of structured residual vectors (SRVs), where one SRV is made insensitive to a specified subset of faults, while remaining sensitive to other faults. The proposed technology is relevant to this subtopic because we will develop an electronic module that can be embedded in low cost sensor electronics to quickly identify both sensor and process faults.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Armstrong Flight Research Center (AFRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Armstrong Flight Research Center(AFRC)	Lead Organization	NASA Center	Edwards, California
Intelligent Automation, Inc.	Supporting Organization	Industry	Rockville, Maryland

Primary U.S. Work Locations	
California	Maryland

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

Dick R Larson

Principal Investigator:

Roger Xu

Technology Areas

Primary:

- TX13 Ground, Test, and Surface Systems
  - TX13.1 Infrastructure Optimization
    - TX13.1.6 Test, Operations, and Systems Safety